

CLAIMS

1. An antenna enabling the shaping of at least one beam of radioelectric waves (4, 5, 61, 62, 91, 92) of at least one determined wavelength, of the type comprising at least one radiating element (2) the waves, preferably passive, placed in a set of wires or bars (1) reflective of the wave and substantially parallel to one another, made of a Photonic Band Gap (PBG) material and forming a determined structure, said determined structure including defects so as to shape said at least one beam in a direction relative to the position and/or of the configuration of said defects,

characterised in that said wires or bars and the defects are arranged on a set of N concentric closed curves of a plane, N being greater than or equal to two, the radiating element being arranged inside the innermost curve and the distance between the curves is smaller than a quarter of the wavelength, the length of a wire/bar being greater than or equal to half the wavelength.

2. An antenna according to claim 1, characterised in that the curves are selected among the circles, the ellipses, the cycloids and, preferably, are all circles, the radiating element being placed substantially in the common centre of said circles.

3. An antenna according to claim 1 or 2, characterised in that the wires/bars or defects adjoining a given curve are arranged in transversally equidistant locations.

4. An antenna according to claim 3, characterised in that the transversal distance of the adjoining wires/bars or defects are all equal for all the curves.

5. An antenna according to claim 4, characterised in that the curves are circles and that the wires/bars or defects are arranged in at least two concentric circles around the radiating element substantially central according to a constant transversal periodic distribution, equal for all the circles.

6. An antenna according to claim 1 or 2, characterised in that the wires/bars or defects are arranged along distribution axes running

through the radiating element and in the plane, in points corresponding to the crossing of the curves and of the distribution axes.

7. An antenna according to claim 6, characterised in that the distribution axes are spaced regularly in the plane over  $360^\circ$  and divide it  
5 into equal angular sectors, the value of an angular sector being preferably  $22.5^\circ$  or a multiple of  $22.5^\circ$ .

8. An antenna according to claim 7, characterised in that the curves are circles and that the wires/bars or defects are arranged in at least two concentric circles around the radiating element substantially  
10 central according to a constant angular periodic distribution, equal for all the circles.

9. An antenna according to any of the previous claims, characterised in that the radiating element is omnidirectional and is preferably a dipole, said dipole being than arranged substantially parallel  
15 to the wires/bars.

10. An antenna according to any of the previous claims, characterised in that the wires/bars are straight.

11. An antenna according to any of the claims 1 to 9, characterised in that the wires/bars are curved.

20 12. An antenna according to any of the previous claims, characterised in that said defects are realised by removing at least partially certain of said wires/bars, said at least one beam being shaped in a direction relative to the position and/or of the configuration of the wires/bars withdrawn.

25 13. An antenna according to any of the previous claims, characterised in that at least certain of said wires/bars are each formed of at least two conductive segments, the maximum length of a segment being smaller than a quarter of the wavelength and preferably smaller than or equal to the tenth of the wavelength, the adjoining segments of a  
30 wire/bar being separated by insulators, each wire/bar with several insulated segments therebetween, designated discontinuous wire/bar (11), being transparent for the wave and equivalent to the defect of a wire/bar at least partially withdrawn.

35 14. An antenna according to claim 13, characterised in that all the wires/bars are wires/bars with several segments.

15. An antenna according to claim 13 or 14, characterised in that at least one of the insulators separating two adjoining segments in a wire/bar comprises or is formed of a switchable active component which may adopt at least one first conductive state for the wave, wherein the  
5 wire/bar with several segments behaves like a reflector, designated continuous wire/bar (10), and a second insulating state for the wave wherein the wire/bar with several segments is transparent for the wave and equivalent to the defect of a wire/bar at least partially withdrawn, and in that said antenna includes moreover control means of said active  
10 components, enabling to force certain of said wires/bars with several segments to behave like discontinuous wires/bars (11), said at least one beam being shaped in a direction relative to the position and/or the configuration of the discontinuous wires/bars.

16. An antenna according to claim 15, characterised in that in a  
15 wire/bar with segments and active switching components, the control is conducted by section(s) formed of a sub-assembly of adjoining segments of the assembly of the segments of the wire/bar, whereas the sub-assembly may include from two up to the total number of segments of the wire/bar, the components separating the segments of a section being  
20 placed into their first state, the other components being in the second state, in order to be able moreover to direct the beam(s) in height relative to the plane.

17. An antenna according to claim 15 or 16, characterised in that the control means of the active components constitute shaping and  
25 switching means between at least one first beam and at least one second beam, so that said antenna is a beam-switching antenna.

18. Antenna according to any of the previous claims, characterised in that it is in a public or private civilian telecommunication network.

19. A base transceiver station of a radiocommunication system  
30 with mobile stations, characterised in that it includes at least one beam-switching antenna according to claim 17 or 18.